WHAT IS CLAIMED:

1. An optical phase modulator comprising:

a multilayer stack, comprising a plurality of dielectric layers and having a transmission function related to at least one optical property of the stack, for receiving an optical input signal to be phase modulated; and

phase modulator means for producing a nonmechanical change in the at least one optical property of the stack to provide shifting of the transmission function to produce phase modulation of the optical input signal and to thereby produce a phase modulated output signal.

2. A phase modulator according to claim 1 wherein said multilayer stack comprises a bandpass multilayer stack.

3. A phase modulator according to claim 1 wherein said at least optical property is refractive index, said dielectric layers each have a refractive index value, and said phase modulator means causes a variation in the refractive index of said dielectric layers such as to produce the shift in the transmission function.

4. A phase modulator according to claim 3 wherein said modulator means decreases the refractive index of said dielectric layers so as to shift the transmission function to shorter wavelengths.

5. A phase modulator according to claim 4 wherein said dielectric layers comprise GaAs and AlAs layers and said decrease is between 0% and 2.0%.

6. A phase modulator according to claim 5 wherein said decrease is about 1.3%.

7. A phase modulator according to claim 1 wherein said dielectric layers comprise both layers having a high index of refraction and layers having a low index of refraction.

8. A phase modulator according to claim 1 wherein said dielectric layers include alternating GaAs and AlAs layers.

9. A phase modulator according to claim 8 wherein layers of relatively thin layers of AlAs are inserted within selected layers of GaAs to smooth the transmission function of the stack.

10. A phase modulator according to claim 8 wherein said layers include a plurality of relatively thick layers of GaAs are interspersed at regular intervals within the stack.

11. A phase modulator according to claim 1 wherein said modulation means comprises means for optically generating free carriers to provide phase modulation of the optical input signal.

12. A phase modulator according to claim 3 wherein said modulation means comprises means for optically generating free carriers to provide phase modulation of the optical input signal.

13. A phase modulator according to claim 1 wherein said modulation means comprises means for externally injecting free carriers to provide phase modulation of the optical input signal.

14. A phase modulator according to claim 3 wherein said modulation means comprises free carrier injection means for adjusting free carrier flow through the stack so as to vary the refractive index of the layers.

15. A phase modulator according to claim 3 wherein the layers are dosed with a medium exhibiting of a refractive index which varies in a nonlinear manner with optical intensity and said modulator means comprises an optical pump for generating an optical beam which, in combination with the propagating optical input signal, modulates the refractive index of the layers.

16. A phase modulator according to claim 1 wherein said dielectric layers include GaAs layers, wherein at least one quantum well is created within each GaAs layer and said modulation means comprises means for applying an electric field to the layers of said stack.

17. An optical switch comprising:

a multilayer stack, comprising a plurality of dielectric layers and having a transmission function related to at least one optical property of the stack, for receiving an optical input signal to be phase modulated; and

optical switching means for producing a nonmechanical change in at least one optical property of the stack to provide shifting of the transmission function to a region of high reflectivity.

18. An optical switch according to claim 1 wherein said at least optical property is refractive index, said dielectric layers each have a refractive index value, and said optical switching means causes an increase in the refractive index of said dielectric layers so as to shift in the transmission function to longer wavelengths.